PATENT ABSTRACTS OF JAPAN

(11)Publication number : 02-277743
(43)Date of publication of application : 14.11.1990

(51)Int.CI. C22C 38/00
C22C 38/54

(21)Application number : 01-097296
(22)Date of filing : 19.04.1989

(71)Applicant : NIPPON STEEL CORP
(72)Inventor : TOMITA YUKIO
YAMABA RYOTA

(54) STEEL PLATE FOR PRESSURE VESSEL HAVING EXCELLENT ELECTRON BEAM WELDING CHARACTERISTICS

(57)Abstract:
PURPOSE: To obtain the steel plate for a pressure vessel having excellent electron beam welding characteristics in which low temp. toughness in the weld zone can be improved even by an electron beam welding method by regulating the compositional limiting value in C, P, N, Mn, Cr, Ni, Mo, etc.
CONSTITUTION: The steel plate constituted of, by weight, 0.13 to <0.16% C, 0.05 to 0.30% Si, 1.15 to 1.50% Mn, ≤0.007% P, ≤0.010% S, ≤0.10% Cu, ≤1.00% Ni, 0.10 to 0.60% Cr, 0.40 to 0.70% Mo, 0.005 to 0.040% Al, 0.0003 to 0.0012% B, 0.003 to 0.006% N and the balance Fe with inevitable impurities is prepd. Furthermore, the content of Ni is preferably regulated to >0.70 to 1.00% in the above compsn.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-054958
(43)Date of publication of application : 22.02.2000

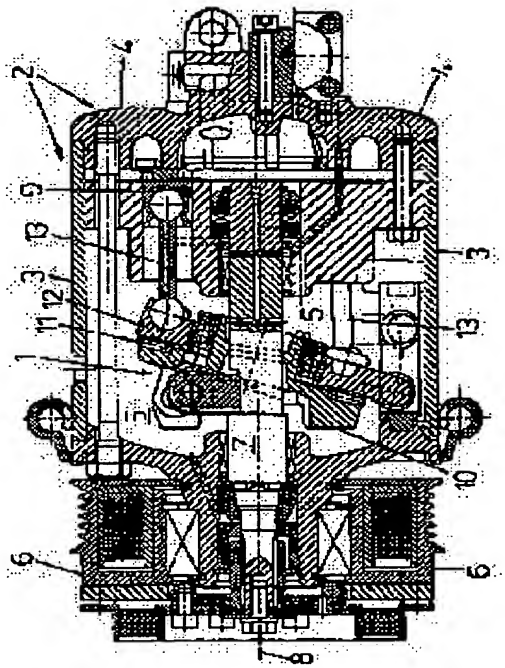
(51)Int.Cl. F04B 39/00
B60H 1/32
F04B 39/12

(21)Application number : 10-214019
(22)Date of filing : 29.07.1998

(71)Applicant : LUK FAHRZEUG-HYDRAULIK GMBH & CO KG
(72)Inventor : JEAN HINRICHS
VOLKER SEIPEL

(54) COMPRESSOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a small-sized compressor without decreasing output.
SOLUTION: This compressor has a housing 2 and a compressor unit 1 for sucking and compressing coolant which is arranged in the housing 2. The compressor, especially for an air conditioner of an automobile is constituted so that the housing 2 is made of extremely rigid material for reducing assembled size with ensuring sufficient compressing output, and able to use gas already having high density in a suction condition as the coolant.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's

decision of rejection]
[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The compressor especially for the air conditioners of an automobile characterized by using the gas which has the compressor unit (1) which has been arranged in housing (2) and housing (2), and which inhales and compresses a cooling agent, and which housing (2) is especially formed from the very strong ingredient in the compressor for the air conditioners of an automobile, and already has a high consistency in an inhalation condition as a cooling agent.
[Claim 2] The compressor according to claim 1 by which housing (2) is characterized by being formed from steel in the whole.
[Claim 3] The compressor according to claim 1 by which housing (2) is characterized by being formed from the bronze alloy in the whole.
[Claim 4] The compressor according to claim 1 by which housing (2) is characterized by being formed from titanium in the whole.
[Claim 5] The compressor according to claim 1 characterized by forming housing (2) from the ingredient by which the fiber consolidation was carried out in the whole.
[Claim 6] The compressor according to claim 1 by which housing (2) is characterized by being formed from composite material in the whole.
[Claim 7] A compressor given in any 1 term to claims 1-6 characterized by the elongation limitation of a housing ingredient being over 2 [500Ns / /] mm.
[Claim 8] The compressor according to claim 7 by which the elongation limitation of a housing ingredient is characterized by there being 700Ns [/] 800N/mm in the range between 2 with 2 mm.
[Claim 9] A compressor given in any 1 term to claims 1-8 to which housing (2) is characterized by being formed with foundry technique in the whole.
[Claim 10] A compressor given in any 1 term to claims 1-8 to which housing (2) is characterized by carrying out deep-drawing formation.
[Claim 11] A compressor given in any 1 term to claims 1-8 to which housing (2) is characterized between the colds and/or by carrying out hot working.
[Claim 12] A compressor given in any 1 term to claims 1-8 to which housing (2) is characterized by carrying out cold-extrusion formation.
[Claim 13] A compressor given in any 1 term to claims 1-12 characterized by having the oiltight and airtight lining of the housing outside surface which housing (2) becomes from a very strong ingredient, and closing in.
[Claim 14] The compressor according to claim 13 characterized by lining consisting of aluminum.
[Claim 15] A compressor given in any 1 term to claims 1-14 characterized by preparing corrosion protection in the outside surface of housing (2).
[Claim 16] A compressor given in any 1 term to claims 1-15 to which a cooling agent is characterized by being inert gas.
[Claim 17] A compressor given in any 1 term to claims 1-15 to which a cooling agent is characterized by being an inactive gas mixture mind.
[Claim 18] The compressor according to claim 17 characterized by a cooling agent being an inactive gas mixture mind containing CO2.

[Claim 19] The compressor according to claim 16 by which a cooling agent is characterized by being CO2.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the compressor for the air conditioners of an automobile for which it has the compressor unit thru/or pump unit which inhales and compresses the cooling agent and refrigerant which have been arranged in housing and its housing especially.
[0002]
[Description of the Prior Art] Many are called an air conditioning compressor and the compressor of the class said here is actually known for various operation gestalten. This kind of compressor has housing and is surrounding the compressor unit thru/or pump unit which that housing drives from the outside. For example, the pump unit formed as an axial piston pump has at least one piston, and the piston can carry out both-way migration within a cylinder block. Usually, many pistons are prepared in this kind of compressor. In case a swash plate rotates, both-way migration of the piston is carried out [in the opposite hand of a swash plate] rather than a hold disk to the longitudinal shaft orientation. In this case, it is fixed to a driving shaft and a swash plate functions like a slant-face cam, it can rotate freely to a swash plate and, as for the hold disk with which ** had the revolution restrained to housing, and the bearing of the ** was carried out, a reciprocating motion is given to a piston.
[0003] Various air conditioning compressors of structure operate a cooling agent and a refrigerant, and selection of a cooling agent or a refrigerant is becoming a problem gradually under the view of ecology in that case. make it any — in current, cooling agent R134a is used overwhelmingly, and the doubt on remarkable ecology is coming out also to this cooling agent as the time passes in that case. The compressor which operates cooling agent R134a known since actual has housing usually formed from the aluminum ingredient, and the housing has about 3 to 5mm stock thickness in the bursting pressure (disruptive strength) of a maximum of 8 MPa(s) set up there. However, the air conditioning compressor known since actual has a problem in that the request which asks for the cooling agent which gets used to an environment 100%, or a refrigerant is increasing gradually. This request comes out to a front face rapidly as an automobile purchaser's environmental consciousness increases.
[0004] When it is determined that an air conditioning compressor is used for an automobile, the request which makes - assembly magnitude small strongly increases to the - said appearance gradually further. However, in a well-known compressor, it does not decrease any more, but in connection with the predetermined thermal output of especially a HVAC system thru/or a cooling output, i.e., refrigeration capacity, and it, the feed volume of the cooling agent and refrigerant according to it or the mass style according to it must be realized, and the minimum assembly magnitude is defined by it.
[0005]
[Problem(s) to be Solved by the Invention] Therefore, the technical problem of this invention is offering the compressor suitable for using it for the air conditioner of the automobile in which the assembly magnitude's decreases as compared with the compressor known conventionally, and neither a compression output nor refrigeration capacity is reduced in that case. Furthermore, the

technical problem of this invention is offering the compressor which enables the activity of the cooling agent and refrigerant which are satisfactory in ecology in that case.
[0006]
[Means for Solving the Problem] The compressor by this invention solves the above-mentioned technical problem according to the description of claim 1. According to it, in the compressor of the class mentioned at the beginning, housing is formed from the very strong ingredient and it is characterized by using the gas which already has a high consistency in an inhalation condition as a cooling agent or a refrigerant.
[0007] According to this invention, it has been recognized also about the assembly magnitude of not only the view of ecology but the compressor which should be decreased that there is semantics very important for a cooling agent or a refrigerant. That is, according to this invention, in the inhalation condition to a compressor, it became clear that already so many heating values are transportable, so that the cooling agent and refrigerant of a gaseous phase gained in the consistency or the pressure. therefore, the atmosphere with which it should feed if a mass flow rate is the same -- a product -- small -- becoming -- it -- a conduit -- cross sectional areas or flow paths decrease in number. Consequently, this kind of a cooling agent and a refrigerant enable it in principle to decrease the assembly magnitude of a compressor on the whole.
[0008] In using a very strong ingredient for housing of a compressor, it becomes possible easily to give the reinforcement which is already needed in an inhalation condition in the case of a high consistency, the generated cooling agent of a high pressure, or a refrigerant. That is, in the runoff temperature of the field of about 160-degreeC to 170-degreeC, bursting pressure (disruptive strength) to 30MPa(s) is realized easily, and it is not necessary to increase the stock thickness of compressor housing as a whole at the sacrifice of assembly magnitude in that case.
[0009] Within the limits of the especially easy configuration of housing, housing can be formed from very strong steel and assembly space decreases in number about 10% compared with aluminum housing based on the mechanical property by it. Furthermore, steel housing brings about a lower manufacturing cost as compared with aluminum housing. Especially this originates in that manufacture is easy and the price of an ingredient being cheap. Furthermore, compared with aluminum, be [the heat conductivity of steel / low], i.e., when there is no heat transfer from the pressure side of compressor housing to an attraction side a deer line crack only, the effectiveness of a compressor is improved.
[0010] Similarly, it is possible to form housing within the limits of other configurations from other very strong ingredients, i.e., for example, a bronze alloy or titanium. It must take care that temperature dependence, such as play of bearing, does not occur so that other ingredients may be considered the same way, it may in that case always have thermal expansion with all almost equal compressor parts and there may be no error related to temperature by it. Similarly as compared with aluminum, it warns for thermal conductivity to be small, and the effectiveness of a compressor is already supported by it, or it must be made to be improved.
[0011] In order to support a very strong material property, the ingredient or composite material by which the fiber consolidation was carried out similarly is also considered. When using the ingredient by which the fiber consolidation was carried out, fiber can be continuously inserted into an ingredient. A fiber consolidation can decrease the stock thickness of housing substantially as compared with an ingredient without the same, especially conventional fiber consolidation on the basis of [suitable and] the bearing nature of the fiber for the optimal force absorption.
[0012] the very strong ingredient considered in principle here -- at least -- the elongation limitation to 500N/mm2, or the yield point -- or it must have at least 700Ns /of 800Ns /of the maximum proof stress, i.e., the destructive limitation, to 2 mm from 2 mm. Ideally, 800Ns/mm of 700Ns /of elongation limitations of a housing ingredient are located in the range between 2 with 2 mm, and workability must be guaranteed further in that case. Housing must be able to bear the very high bursting pressure (disruptive strength) to about 30 MPa(s) in the stock thickness in which min is possible.
[0013] In a manufacturing-technology-viewpoint, housing can be formed with foundry technique in the whole on the basis of housing which especially consists of steel. In principle, it is possible

to form housing with deep drawing, cold working and/or to carry out hot working, or a cold extrusion. In that case, ingredient selection is important.

[0014] It is especially effective, if it has the oiltight and airtight lining of closing in in addition to the front face of housing with which housing consists of a very strong ingredient when sufficient oiltight nature and airtightness are not acquired with very strong housing. This lining can also be formed from aluminum and the mechanical property of lining is seldom thought as important in that case. In the point, the combination of very strong outside housing, an oiltight, and airtight inside housing is formed. It is still more effective, if a means to prevent corrosion is formed in the lateral part or lateral surface of a housing component when using steel very strong especially as a housing ingredient. In the point, direct especially, it is the configuration of coating strong against remarkable temperature for example at least, and corrosion protection can be prepared in the front face of the outside of housing.

[0015] The description which is in the above explanation and is already first required of the 1st here – It is emphasized that gas – which already has a high consistency or a high pressure in a very strong housing ingredient and an inhalation condition is the combination of the description which reached to an extreme of **** for decreasing the assembly magnitude or assembly space of a compressor indirectly. In the point, it is very effective in it being, the gas which prevents the reaction whose it is not desirable about the cooling agent or refrigerant which should be used, i.e., the nonpoisonous gas, of the ingredient within inert gas, i.e., the open air, such as helium, neon, and an argon. it — responding — a cooling agent and a refrigerant — inert gas — the inert gas containing gaseous mixture (CO_2), i.e., a carbon dioxide, — you may be gaseous mixture. Inert gas CO_2 is suitable for the very desirable thing as a cooling agent or a refrigerant, and a high pressure is brought to the interior of a compressor by it. In using CO_2 unlike a conventional cooling agent and a conventional refrigerant, in a high voltage part, liquefaction is hardly performed. CO_2 can be mostly supplied to infinity, it is nonpoisonous, is incombustibility and does not bring remnants or damage further to an environment at all.

[0016] When suction pressure is about 30 bars, the exhaust pressure force exceeding 80 bars is acquired, according to the consistency of CO_2 being comparatively high in that case, as compared with a conventional cooling agent and a conventional refrigerant, a mass flow rate can be left as it is, and a very high thermal output, or the cooling output and refrigeration capacity of a HVAC system can be realized. Eventually, the volume of the cooling agent with which it should feed also in the same output, or a refrigerant decreases, and the smaller assembly magnitude of a compressor is obtained in the output request beforehand defined by it.

[0017] The idea of this invention is constituted from a desirable approach, and there are the various approaches of developing. Therefore, explanation of the example of each claim subordinate to claim 1 and the following this inventions can be referred to. Generally [this idea] in relation to explanation of the desirable example of this invention using a drawing, a desirable configuration and expansion are also explained.

[0018]

[Embodiment of the Invention] The example only shown as an example in drawing 1 is an axial piston mold compressor, and the compressor unit 1 which is not explained in detail in that case here is arranged in housing 2. Housing 2 has two housing parts 3 and 4 in the whole, the housing part 3 forms the so-called actuation room 5 in that case, and the compressor unit 1 is arranged in it. As for the housing part 3, the appearance is reduced in the end. The housing part 3 has the hub which projects in the flange and shaft orientations of the direction of a path in said end. The belt disk 3 is supported by the periphery of this hub free [a revolution]. The flywheel fixed to said end side and the driving shaft 7 inserted in opening of a cutback part has fixed the belt disk 6 to said flywheel. The belt disk 6 and a flywheel are the same outer-diameter sizes as substantially as the housing part 3. The housing part 4 has fixed so that this may be sealed to other end opening of the housing part 3. And the housing part 3 is being firmly fixed with the housing part 4 and the bolt including the flange.

[0019] The compressor unit 1 is driven with an internal combustion engine through the belt disk 6. Driving force is transmitted to the driving shaft 7 which rotates centering on a revolving shaft 8 through the belt disk 6 and a flywheel. The driving shaft 7 is supported free [a revolution] in

the field of the belt disk 6 within housing 2. Moreover, the revolving shaft 7 is supported free [a revolution] also by the block which supports a piston 9 free [reciprocation] to the other end side of the housing part 3.

[0020] The swash plate 10 for carrying out both-way actuation of the piston 9 is formed in the driving shaft 7. The swash plate 10 has fixed to the driving shaft 7, and it performs eccentric motion, rotating. The hold disk 12 is formed in the other end side (right-hand side) of a swash plate 10. The hold disk 12 is supported through the needle bearing 11 and the ball bearing to the slant face of a swash plate 10, and the shaft side peripheral face, respectively. Moreover, this hold disk 12 is supported so that it may be stopped by the slider in housing 2 and may not rotate. And if a swash plate 10 rotates with a driving shaft 7, the hold disk 12 will perform splash motion.

[0021] The hold disk 12 is combined with 1 or two or more pistons 9 through the connecting rod 13. The piston 9 is fitted in the boa of a block free [sliding]. As for each connecting rod 13, ends are spherical. The hold disk 12 and the piston 9 have the pocket which contains the spherical edge of a connecting rod 13, respectively. Thereby, when a swash plate 10 rotates, congruence directional movement of the piston 9 is carried out to the longitudinal shaft orientation through the hold disk 12. In addition, many pistons 9 are formed in the example explained with reference to drawing 1 . The cooling agent and refrigerant which were inhaled in housing 2 are compressed when a piston 9 reciprocates, and they are supplied outside.

[0022] According to this invention, housing 2 or the housing parts 3 and 4 are formed from the very strong ingredient, and are formed from very strong steel especially in this example. Inert gas 2, i.e., CO, is used as a cooling agent. With the combination of this description, on the whole, the assembly magnitude of a compressor decreases, and sufficient compressor output based on explanation of the induction of explanation detailed in that case is guaranteed. namely, the increase of the amount of heat transfers make the mass flow rate of a cooling agent increase by the same volume by attracting CO2 which is a cooling agent with positive pressure (gage pressure), making it a cooling agent have a high consistency, compressing the cooling agent further and already feeding with it in an inhalation condition, in housing 2, and according to a cooling agent -- it can carry out and cooling effectiveness can be raised. The example which what to emphasize at the end gave as an above-mentioned mere example only explains the idea of this invention, and the idea of this invention is not being what is limited to this example.

[0023]

[Effect of the Invention] In this invention, assembly space can decrease in number about 10% by forming housing from very strong steel compared with aluminum housing based on the mechanical property. Steel housing can reduce a manufacturing cost according to that manufacture is easy and the price of an ingredient being cheap as compared with aluminum housing. Compared with aluminum, according to the heat conductivity being small, steel can improve the cooling effectiveness of a compressor, when there is no heat transfer from the pressure side of compressor housing to an attraction side a deer line crack only.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The side elevation showing the example of a compressor based on this invention in a cross section.
[Description of Notations]
1 Compressor Unit
2 Housing
3 Housing Part (Cylindrical)
4 Housing Part (Trailer by the side of End Face)
5 Actuation Room (Inside of Housing Part 3)
6 Belt Disk
7 Driving Shaft
8 Revolving Shaft (Driving Shaft)
9 Piston
10 Swash Plate
11 Bearing
12 Hold Disk
13 Connecting Rod

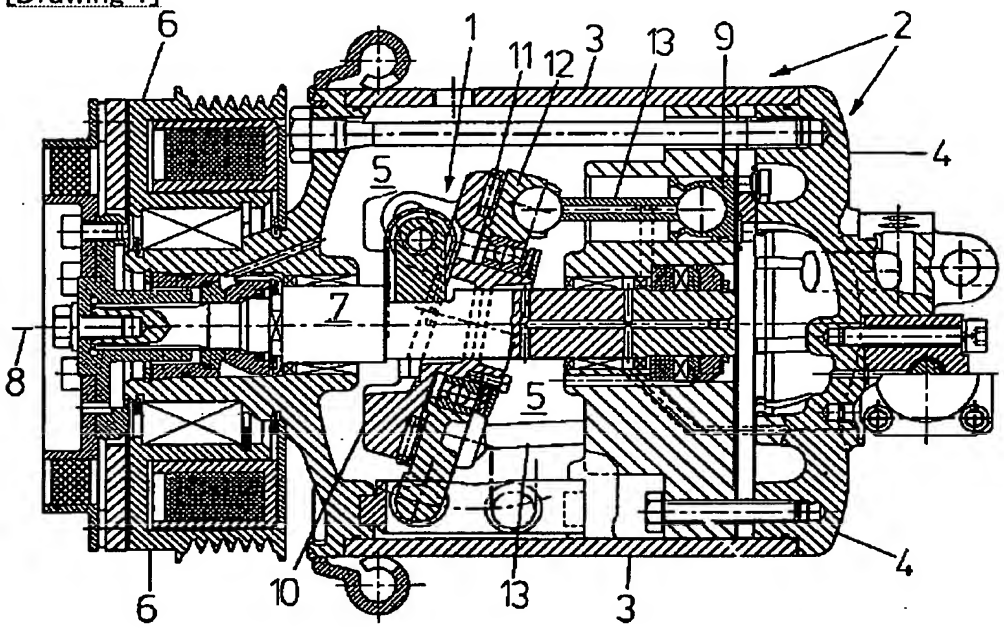
[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Translation done.]